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Claims

[c1] A method of determining a vehicle attitude or angular velocity, comprising:
calculating, on-board the vehicle, a stayout zone associated with a bright object, or a plurality of objects;
determining a star in the stayout zone; and
determining a vehicle inertial attitude or angular velocity, based on star measurements of sensed or tracked stars, excluding the star within the stayout zone.

[c2] A method as recited in claim 1 wherein calculating a stayout zone comprises calculating a circular stayout zone.

[c3] A method as recited in claim 1 wherein calculating a stayout zone comprises calculating a non-circular stayout zone.

[c4] A method as recited in claim 1 wherein excluding is performed for a fixed period of time.

[c5] A method as recited in claim 1 wherein excluding is performed for a non-fixed period of time.

[c6] A method as recited in claim 1 wherein exclusion of a

star is dependent on properties of the star, as well as properties of the object.

[c7] A method as recited in claim 1 wherein further comprising determination of the orientations of multiple star trackers or sensors, with respect to each other, when there is more than one star sensor or tracker used on-board.

[c8] A method as recited in claim 1 wherein further comprising controlling vehicle attitude or angular velocity, in response to the determined inertial attitude or angular velocity.

[c9] A method as recited in claim 1 wherein excluding the star is performed on-board the vehicle.

[c10] A method of determining a vehicle attitude or angular velocity, comprising:
calculating a stayout zone associated with a bright object, or a plurality of objects;
calculating the stars inside the stayout zone intruded by a bright object therein;
listing the stars inside the stayout zone in an exclusion list;
flagging star catalog or database entries, corresponding to stars listed on the exclusion list, as excluded from

consideration by the attitude determination algorithm and procedure or the angular velocity determination algorithm and procedure; and
determining a vehicle inertial attitude or angular velocity, in response to data including star position measurements and the star catalog.

[c11] A method as recited in claim 10 wherein calculating a stayout zone comprises calculating a circular stayout zone.

[c12] A method as recited in claim 10 wherein calculating a stayout zone comprises calculating a non-circular stayout zone.

[c13] A method as recited in claim 10 wherein excluding is performed for a fixed period of time.

[c14] A method as recited in claim 10 wherein excluding is performed for a non-fixed period of time.

[c15] A method as recited in claim 10 wherein exclusion of a star is dependent on the properties of the star, as well as properties of the object.

[c16] A method as recited in claim 10 further comprising determining orientations of multiple star trackers with respect to each other.

[c17] A method as recited in claim 10 wherein further comprising controlling vehicle attitude or angular velocity, in response to the vehicle inertial attitude or angular velocity.

[c18] A method as recited in claim 10 wherein calculating a stayout zone is performed on-board the vehicle.

[c19] A method as recited in claim 10 wherein excluding the stars is performed on-board the vehicle.

[c20] A method as recited in claim 10 wherein the steps of calculating a stayout zone, calculating the stars inside the stayout zone, listing the stars within the stayout zone in an exclusion list, flagging star catalog or sub-catalog or star database entries, corresponding to stars on the exclusion list, as excluded from consideration by the attitude determination algorithm or procedure, or the angular velocity determination algorithm or procedure, and determining a vehicle inertial attitude or angular velocity, based on measurements of sensed or tracked stars, and the star catalog.

[c21] A method of determining a vehicle attitude or angular velocity, given N interfering bright objects, comprising the following steps:

a)setting a parameter x to 1

b)calculating a stayout zone associated with object x;

c)calculating the stars inside the stayout zone of object x;

d)listing the stars within the stayout zone of object x in an exclusion list;

e)flagging star catalog or sub-catalog entries as excluded stars if listed in the exclusion list;

f)repeating steps b through e for values of x from 2 to N, where N is an integer greater than 1;

g)determining a vehicle inertial attitude or angular velocity in response to star position measurements, and the star catalog.

[c22] A method as recited in claim 21 wherein flagging is performed within the vehicle.

[c23] A method as recited in claim 21 wherein calculating a stayout zone comprises calculating a circular stayout zone.

[c24] A method as recited in claim 21 wherein calculating a stayout zone comprises calculating a non-circular stayout zone.

[c25] A method as recited in claim 21 wherein flagging is performed for a fixed period of time.

[c26] A method as recited in claim 21 wherein flagging is per-

formed for a non-fixed period of time.

[c27] A method as recited in claim 21 wherein flagging is dependent on the properties of the star, as well as properties of the object.

[c28] A method as recited in claim 21 wherein further comprising determination of the orientations of multiple star trackers or sensors, with respect to each other, for the case where there are more than one star sensor or tracker used on-board.

[c29] A method as recited in claim 21 wherein further comprising controlling vehicle attitude or angular velocity, in response to the vehicle's estimated inertial attitude or angular velocity.

[c30] A vehicle system comprising:
a vehicle comprising,
an attitude control system or angular velocity control system;
a star tracker having field of view;
a star catalog memory having a star catalog stored therein said star catalog having a plurality of entries, each entry having an associated flag therewith;
an exclusion list memory; and
a processor coupled to said attitude or angular velocity

control system and said star catalog, said exclusion list memory, said processor calculating a stayout zone on-board the vehicle, determining a plurality of objects in the stayout zone, excluding at least one of the objects from the field of view within the stayout zone to form a revised database, star catalog, or star sub-catalog, determining a vehicle inertial attitude, or angular velocity or relative star sensor or tracker alignment estimate, in response to the revised database, star catalog, or star sub-catalog.

[c31] A vehicle system as recited in claim 30 wherein the vehicle comprises a spacecraft.